

associated color, establishing the effect variable, generating an intermediate image having the associated color, modifying the intermediate image as a function of the effect variable, generating the electronic image as a function of the paint formula, and displaying the electronic image.

Brief Description of Drawings

- [] Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:
- [] Figure 1 is a block diagram of a computer system for providing an electronic image displaying effect paint samples, according to an embodiment of the present invention;
- [] Figure 2 is a block diagram of a computer system for providing an electronic image displaying effect paint samples, according to an embodiment of the present invention;
- [] Figure 3 is a flow diagram of a method for providing an electronic image displaying effect paint samples, according to an embodiment of the present invention; and
- [] Figure 4 is a flow diagram of a method for providing a constructed microscopic image of an effect paint sample according to an embodiment of the present invention.

Detailed Description

- [] Referring to the Figures, wherein like numerals indicate like or corresponding parts throughout the several views, a computer based system 100 for creating an electronic image displaying effect paint samples is provided. Generally, the method includes the steps of establishing a paint formula having an effect variable, and generating the electronic image as a function of the paint formula.
- [] With particular reference to the embodiment illustrated in Figure 1, the system 100 includes a database 102 and a processing unit 104. The database 102 may include paint formulas and other information. In one embodiment of the present invention, the processing unit 104 is embodied in a computer 106 and a computer program application 108 running on the computer. The user 110 interacts with the computer program application 108 through a graphical user interface or "GUI" 112. Furthermore in another embodiment, the system 100 may include a plurality of computers 106 which are connected into a network (not shown). Specified computers or users on the network have access to the system and methods of the present invention.

- [] In one embodiment, the system 100 may include a printer 114 which allows color swatches and other data to be printed on paper. Alternatively, the printer 114 may be separate from the system 100 or connected to another computer on the network.
- [] With reference to Figure 2, the system 100 includes a first module 202 and an image module 204 coupled thereto. In one embodiment, the first module 202 and the image module 204 are implemented in the computer program application 108 running on the computer 106.
- [] In another embodiment, the first module 202 is implemented on a first computer (not shown), such as a personal computer or a wireless computing device. The first module 202 is adapted to be operated by a user or operator through a customer interface 206 located at a remote location. The interface 206 allows the operator to log on to the system 100 and request and receive information, such as paint formulas. The customer interface 206 is graphical in nature, and is accessed through a generic world wide web (WWW) browser, such as Microsoft® Internet Explorer, available from Microsoft of Redmond, Washington. The image module 204 is implemented on a second computer (not shown). Generally, the image module 204 is adapted to generate the electronic image as a function of the paint formula. The first module 202 is coupled to the image module 204 across a computer network 208 such as the Internet.
- [] The first module 202 is adapted for establishing a paint formula having an effect variable, wherein establishing the paint formula includes inputting the formula by a user or from another source, receiving the formula from a data file or database, or any other suitable means for establishing the paint formula. The effect variable may include a variable representing a flake-like material added to paints to produce a sparkle and color values which change with viewing angle. Variables commonly consist of a variable representing an aluminum or mica based flake. The flakes may be coated with a pigment layer and may even include multiple layers of differing optical and color properties. The paint formula represents the color and effect variables by quantity, such as weight. The effect variable in the paint formula represents the sparkle and texture.
- [] The paint formulas stored in the database 102 can be created by measuring color automotive color standards or color swatches with a spectrophotometer. The database 102 is embodied in software. The color values are then transformed to R (red), G (green), B (blue) values. The color values are implemented in software and stored in the database 102. As such, the color values may be retrieved from the database 102. The color values may be derived from the paint formula using a neural network, linear transformation, or any other suitable routine for deriving color values from the paint formula. However, the spectrophotometer does not record the sparkle and texture created by effect variables. Instead, the sparkle and texture must be established as a function of effect variables in the paint formula.

- [] In addition, to construct an electronic image having a microscopic image of a paint formula as a function of a plurality of sets of particle images, each set of particle images represents an effect variable and is stored in the database 102. These sets are used to construct a microscopic image of the paint formula.
- [] The effect variable may represent a metallic flake, a pearl flake, a sparkle effect, an intensity effect, viewing angle, or any other suitable effect variable. The effect variable includes at least one associated attribute, such as quantity and concentration, having an associated property, such as size, color, and transparency. For example, the associated attribute may include the quantity, e.g., weight, of the particular associated property. The effect variable represented in the paint formula indicates a flake pigment of a particular size, a particular color or a particular transparency in a particular concentration.
- [] The first module 202 is adapted to establish the effect variable as a function of the paint formula. The first module 202 is also adapted to establish the associated attribute and the associated property. The associated property may be established as a function of the associated attribute.
- [] The image module 204 is adapted to generate an intermediate image having an associated color. The image module 204 is further adapted to generate an intermediate image as a function of at least one set of particle images.
- [] The associated color is the primary or background automotive color represented in the image. The associated color may be determined as a function of the paint formula, as a function of color values, or by any other suitable means. The image module 204 is further adapted for modifying the intermediate image as a function of the effect variable and/or the particle image.
- [] Due to manufacturing differences in image modules 204, the RGB values may be displayed as a different hue than the true associated color. For example, the associated color may be red, yet displayed by the image module 204 as orange. Thus, the image module 204 is adapted to apply a calibration factor to the color values to ensure that the associated color displayed matches the actual associated color represented by the color values. The image module 204 is further adapted to apply a calibration factor to the particle image to ensure that the particle image displayed represents the true effect variable. The image module 204 is also adapted to correlate the effect variable established as a function of the paint formula with the particle image in the microscopic image.
- [] In addition, the image module 204 is adapted to generate the electronic image as a function of the paint formula and for displaying the electronic image. The displayed

electronic image may include a plurality of pixels, wherein each pixel or cluster of pixels represents an associated color or an effect variable particle.

- With reference to Figure 3, a computer-based method 300 for creating an electronic image displaying effect paint samples will now be explained. Preferably, the method is embodied in software. In a first control block 302, a paint formula having an effect variable is established. As discussed above, the effect variable may include at least one associated attribute having an associated property. The paint formula may be retrieved from a database, input from the customer, or established by any other manner that is suitable for establishing a paint formula. In a second control block 304, the associated color is determined. The associated color may be retrieved from a database, obtained via a neural network system, or determined by any other manner that is suitable manner. In a third control block 306, the effect variable is established having the associated attribute and the associated property. In a fourth control block 308, a value of the associated attribute is established. In a fifth control block 310, an intermediate image is generated as a function of the associated color. In a sixth control block 312, the intermediate image is modified as a function of the effect variable. In an seventh control block 318, a calibration factor is applied to the RGB values of the associated color such that the associated color displayed represents the true associated color. In an eighth control block 316, the electronic image is generated as a function of the paint formula. In a ninth control block 318, the electronic image is displayed. Because the effect variables may produce an image whose properties vary with viewing angle, this method may be used to generate images of the paint sample as though viewed at a variety of viewing angles.
- Referring to Figure 4, a computer-based method 400 for constructing an electronic image having a microscopic image of a paint sample will now be explained. Preferably, the method 400 is embodied in software. In a first control block 402, a paint formula having an effect variable is established. The paint formula may be retrieved from a database, input from the customer, or established by any other manner that is suitable for establishing a paint formula. In a second control block 404, a set of particle images for each effect pigment is established as a function of the paint formula. The set of particle images may be retrieved from a database, input from the customer, or established by any other suitable manner of establishing a particle image. In a third control block 406, the particle image is modified. In a fourth control block 408, an intermediate microscopic image is generated as a function of the modified particle image. In an fifth control block 410, a second calibration factor is applied to the particle image of the effect variable such that the particle image displayed represents the true effect variable. In a sixth control block 412, the microscopic image is generated as a function of the paint formula. In a seventh control block 414, the microscopic image is displayed.